classed under the genus Hadrocheilus, and are distinguished by numerous specific names.

Mr. G. C. Crick describes a new genus and species of dibranchiate cephalopod, *Belemnocamax boweri*, from the Lower Chalk (Totternhoe Stone) of Lincolnshire (Proc. Geol. Assoc., vol. xxi., 1910, p. 360). Belemnocamax resembles Actinocamax generally, but has a broad ventral furrow, and fine longitudinal striæ near the point of the guard.

Dr. A. Till (*Verhandl. k.k. geol. Reichsanstalt*, 1909, p. 194) establishes a new genus, Villania, for an ammonite allied to Perisphinctes, found in an Oxfordian horizon at Villany, in Hungary.

Mr. T. D. A. Cockerell continues his studies of Tertiary insects (*Am. Journ. Sci.*, vol. xxvii., 1909, p. 381), introducing three new genera, and Mr. H. F. Wickham (*ibid.*, vol. xxix., 1910, p. 47) compliments him by describing *Calosoma cockerelli*, among other fossil Coleoptera from the Florissant (Oligocene) deposits of Colorado.

Mr. L. J. Wills (Proc. Geol. Assoc., vol. xxi., 1910, p. 302), in a paper on the fossiliferous Lower Keuper rocks of Worcestershire, describes in considerable detail three species of Mesophonus, a new scorpion, fragmental remains of which occur abundantly at Bromsgrove. Numerous photographs of these remains are given, as well as of the plants from the same strata.

Mr. Bashford Dean's studies on fossil fishes (sharks, chimæroids, and arthrodires) forms part v. of the ninth volume of the Memoirs of the American Museum of Natural History (1909). The memoir is finely illustrated, and deals mainly with the cladoselachians of the Devonian period, which are viewed, in agreement with the opinion of Dr. A. S. Woodward, as primitive sharks. The author regards them as nearer the earliest fish-type than are the acanthodians of the Upper Silurian epoch (p. 247). Photographs and descriptions of mounted skulls of Dinichthys and Titanichthys are also given.

The distribution of the Deinosauria in time and through geographical areas is the subject of a memoir by Mr. R. S. Lull (*Am. Journ. Sci.*, vol. xxix., 1910, p. 1). As the result of a wide range of reading, the author has drawn up distributional tables, and maps illustrating the probable routes of migration. The maps furnished by De Lapparent for various Mesozoic periods are found to supply the necessary bridges between existing lands in which deinosaurian remains have been found. Incidentally, several suggestive remarks are made. On p. 5 bipedal movement is associated with the necessity for rapidly traversing lands increasing in aridity. The bipedal lizards of the present day occur in semi-arid areas. The carnivorous and bipedal deinosaurs, the Theropoda, are the most widely distributed, and appear to have followed any other forms that furnished them with food. The armoured and herbivorous Orthopoda are regarded as originating with Scelidosaurus of the English Lias, and as having become sluggish and quadrupedal in the course of time, when their heavy armour rendered them impregnable (p. 11). At this period, including the epochs when Polacanthus and Triceratops flourished, vegetation and water seem to have been abundant. The mystery of the extinction of the deinosaurs is not lightened by the passing reference to geographical conditions on p. 37.

Mr. Harold Brodrick (Proc. Liverpool Geol. Soc., vol. x., part v., 1909, p. 327) describes and figures footprints, doubtless deinosaurian, found by him in the Inferior Oolite at Saltwick, south of Whitby. It would be very interesting to know if the zone also contains marine fossils, in view of Mr. Lull's comparison of aquatic deinosaurs and hippopotamuses, the latter having been seen to move from estuary to estuary through sea-water.

Mr. A. Zdarsky contributes a memoir on the Miocene Mammalia of Leoben, in Styria, to the *Jahrbuch der k.k. geologischen Reichsanstalt*, Bd. lix., 1909, p. 245. These occur in a terrestrial sandstone above clay and brown coal, the last-named stratum resting on Palæozoic slates. Various rhinoceroses and Suidæ occur. Among the latter, the author places a new genus and species, *Xenochoerus leobensis* (p. 264), represented by part of a mandible and a row of teeth from the upper jaw. Mastodon and Deinotherium are both present, and the deposit appears (p. 287) to be of Middle Miocene age.

Mr. Franz Toula, in the same journal (Bd. lix., 1910, p. 575), records the results of an investigation of a preglacial or interglacial bone-deposit near Kronstadt, in Transylvania. The mammalian remains collected from this in recent years have become somewhat scattered; but the author has examined most of them, and especially describes the teeth of a new form, *Rhinoceros kronstadtensis* (p. 580). Among the bones of Cervus there is a phalange that suggests the presence of the giant deer of Ireland.

The *Sitzungsberichte vom naturhistorischen Verein der preussischen Rheinlande und Westfalens* for 1908 (published in 1909) contains numerous abstracts of papers read before its component societies. Dr. Elbert described at Münster (Section C, p. 51) his expedition to Java in search of the predecessors of the human race. It may be well to recall that he found traces of hearths in deposits that showed the existence of man side by side with Stegodon. He believes that primæval man entered Java with the Siwalik fauna at the close of Cainozoic times, and that Pithecanthropus was entombed during a cold "diluvial" epoch, when floods were caused by the action of lavas on the snows. The evidence for this colder epoch is furnished by the fossil plants of the Kendeng beds, which represent species that now live at much higher elevations. Dr. Elbert considers that Pithecanthropus was forced to retreat before primæval man, while a land-connection was still open with Celebes, and that various pigmy races may have descended from this genus.

Without entering seriously on the literature of primitive man as a branch of palæontology, we may perhaps direct attention to the spirited description by the late Commandant Molard of the prehistoric drawings of animals in the cave of Niaux, in Ariège (*Spelunca*, tome vii., p. 3), and to Dr. Florentino Ameghino's illustrated account, previously promised, of stone implements found near Mar del Plata. The latter paper (*Anales del Museo Nacional de Buenos Aires*, tomo xx., April 22, p. 189) maintains that the pebbles with chipped ends are in some ways more primitive than eoliths, and attributes them to *Homo pampaeus* of the Tertiary era. G. A. J. C.

A MONOGRAPH OF THE JELLYFISHES.[1]

ANY attempt to arrange the Medusæ of the world in a natural and convenient zoological system is beset with so many exceptional difficulties that the author of this very fine monograph must at least be congratulated on the courage he has shown and the patience he has exhibited in preparing and publishing his work.

Since Haeckel wrote his famous "System der Medusen" in 1879 there has been no other standard monograph on the group for systematic zoologists to consult, and the need for a comprehensive revision of his classification has been acutely felt. In many cases the forms which Haeckel described as distinct genera have proved, in the light of more modern research, to be but stages in the development of one genus; many new genera and species have been described, and our knowledge of the life-history, anatomy, and physiology of many of the old species has been very widely extended. To bring together the results of all these investigations into one great monograph, to criticise, and to rearrange the genera, is the task which Mr. Mayer has attempted, and, it may be said, with no small measure of success.

The principal difficulty in the systematic arrangement and nomenclature of the Medusæ arises from the fact that in some cases, but not in all, the free-swimming, bell-like and sexually mature organism represents only a stage in the life-history of an individual, or the detached sexual organ of an individual which has an altogether different form, and there are many examples of the sedentary or hydroid stage of a species being known by one generic name and the free-swimming or medusoid stage by another. It may have been an ideal of the earlier writers, which they themselves could not hope to attain, that ultimately the sum total of the life-history of a single species would be united under one generic and one specific name. But this ideal appears to be in these days not only more remote, but even impossible to reach. As the author points out, such dissimilar hydroids as Syncoryne and Stauridium give rise to similar medusæ of the genus Sarsia, and on the other hand the dissimilar medusæ Bougainvillia (formerly known as Hippocrene or Margelis) and Nemopsis are produced by gemmation from closely related species of the hydroid genus Bougainvillia. An attempt, therefore, to construct a system under which the name of the hydroid stage would supersede the name of the medusa stage, or *vice versâ*, even if it were confined to those species of which the life-history is known, would lead to a state of confusion even worse than that which at present exists. For the present, then, we may agree with the author that the nomenclature of the medusæ and the nomenclature of the hydroids must be, in the majority of cases, kept distinct, but at the same time regret may be expressed that he has not set forth his views of the classification of these Cœlenterates in some tabular form with the families of the hydroids and medusoids arranged in parallel columns. Such a table would necessarily be incomplete and subject to several exceptions in detail, but it would be extremely useful to those who are interested in the Hydromedusæ as a whole and of great assistance to naturalists who are endeavouring to work out their life-histories. Such a table has recently been drawn up by Stechow in a work on the Hydroids of Japan, which was published, unfortunately, too late to be reviewed in Mayer's memoir. A comparison of a table by Mayer, had he constructed one, from the medusoid point of view with that of Stechow from the hydroid point of view, would have given us a very instructive review of the classification of the Hydromedusæ as a whole.

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[1] "Medusæ of the World." By Alfred Goldsborough Mayer. 3 Vols. Vol. i., pp. iv+230+xv; Vol. ii., pp. iv+231-498+xv; Vol. iii., pp. iv+499-735. (Carnegie Institution of Washington, 1910.)

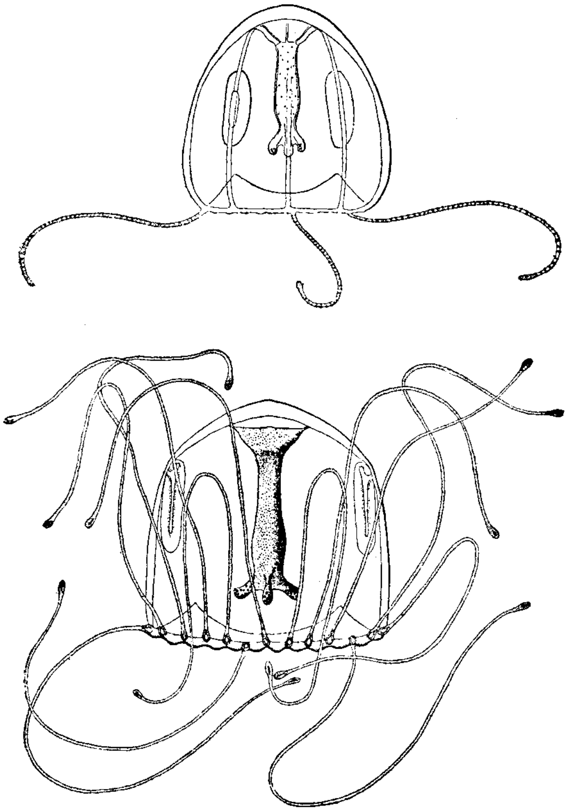

FIG. 1.—*Persa incolorata*, one of the Trachymedusæ.

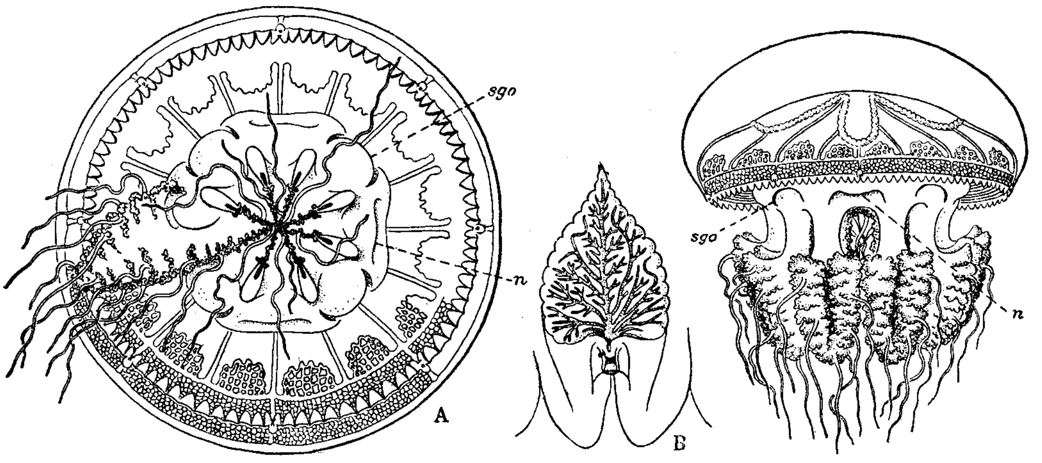

FIG. 2.—*Lychnorhiza bartschi*, one of the Rhizostome Scyphomedusæ. A, Oral view. B, Sense-organ seen from exumbrella side.

But it seems somewhat ungracious to begin a notice of work that is characterised by so many excellent features by complaining about an omission.

The first point that will strike the ordinary zoologist, who is not a specialist in any one group, as a very welcome and important novelty in monographs on systematic zoology, is the inclusion in the text of a statement concerning all the important contributions to our knowledge of embryology, cytology, and physiology of the subject group. This is not a work that can be set aside as a systematic treatise, of value only when it is required for the identification of a species, but it is one that can and should be consulted by all those who are interested in the morphology of the group. Special attention may be directed to the excellent accounts, given in various places in the text, of the physiology of the rhythmic contractions of the bell, and the lucid statement concerning the recent researches by Stschelkanowzeff on the extraordinary developmental process in Cunina described by Metschnikoff as "sporogony"; but there are many others to relieve the tedium that is inseparable from a series of purely systematic descriptions.

In dealing with the two genera Ctenaria of Haeckel and Hydroctena of Dawydoff, which have been supposed to connect the true Cœlenterates with the Ctenophora, the author takes the perfectly sound position that the resemblances relied upon indicate no true genetic relationships between the two classes, but he incidentally directs attention to an interesting observation of Woltereck's that in the larva of Solmundella and in the actinula larva of Tubularia there is an apical pole-plate of ciliated ectodermal cells. This does not constitute an aboral sense-organ on such an elaborate scale as that described in Hydroctena, but it indicates, at least, that this organ is not necessarily a sign of Ctenophore affinities. As in other divisions of the Cœlenterata, the determination of true or natural specific distinctions in Medusæ from false or accidental differences is extremely difficult. A great many species have been described from the more or less distorted and contracted specimens that are sent to systematic zoologists by the collectors, and it is very probable that many of the folds and wrinkles, and even the warts and tubercles, that are relied upon for separating species are due to post-mortem changes. Mr. Mayer deals with this problem with sound judgment. The work of previous authors is carefully considered and tabulated, so that the reader may form his own judgment in each case if he wishes to do so; but his own opinion, based on a wide experience of living and preserved material, is clearly expressed. Thus, of the genus Pelagia, no fewer than fourteen species have been described, of which six are from the Atlantic Ocean. "All of the Atlantic species," he says, "are closely related one to another, and future researches may demonstrate that they are only geographical races."

It would be difficult to express adequately our admiration of the seventy-six coloured plates with which this monograph is illustrated. As regards delicacy of treatment and accuracy in detail, they may be regarded as the best series of zoological plates that have been published for many years. In addition to the plates, there are more than four hundred text illustrations in black and white. The majority of these are copied from the works of other authors, but there are several, such as the two specimens we reproduce, that have not been previously published.

Important changes in well-known generic names are not so common as in some other recent memoirs, but there are some which many students of the group will notice with regret. Thus the familiar genus Lizzia becomes merged in Rathkea; Corynitis becomes Linvillea. The generic name Turris, having been used by Humphrey in 1797 for a mollusc, is regarded as preoccupied, and this genus of Medusæ becomes Clavula. As examples of changes in spelling, we may refer to the genus Irene, which becomes Eirene, and Aurelia, which becomes Aurellia. But the most deplorable proposal in this respect is that the name Craspedacusta should be used in place of Limnocodium. It is clear from the text that the author has made this change with regret, since he realises the great inconvenience that must be caused by the substitution of a name that has been used only once, and in a preliminary note, for a name that has been used consistently by all authors, including the writer of the preliminary note, ever since. That the change has been made is due to the mandate of the International Commission on Zoological Nomenclature, who stated that the usage of the name Limnocodium would be "in contravention of the provisions of the Code." No better example could be found to show the pressing need of some revision of the Code. We cannot close this notice without again expressing our thanks to Mr. Mayer for his most magnificent and serviceable memoir. It is really a great work, and will mark a great step of progress in the literature of the subject.

MEASURES OF SOLAR PARALLAX.[1]

THE particular value of solar parallax derived from the discussion of any one set of measures is of smaller consequence than the manner in which the result has been achieved. The interest in the problem has shifted. In its present position, the knowledge of the distance of the sun from the earth is less important than the examination and elimination of the causes that affect the accuracy of the measured coordinates obtained from a series of plates. Viewed in this light, Prof. Perrine's paper is of great value, for it puts us in possession of an independent discussion of material that has already been submitted to the most careful scrutiny.

We have presented to our examination a numerical estimate of the different constructions that expert knowledge can place upon the same measures. Mr. Hinks, in his elaborate discussion of the solar parallax from photographic observations of Eros, pointed out some discrepancies in the Lick results, which he thought required further examination. Among others, he suggested that some of the comparison stars were too distant from the axis of collimation. Apparently this criticism was justified, and Prof. Perrine has employed in his reductions only those star images which were accurately circular. A second suggestion, that an error was introduced by the eccentric position of Eros with reference to the stars of comparison, is not accepted. This want of symmetry arose from the plan of choosing the same stars for the morning and evening observations, a scheme which possesses obvious advantages; but in a plate taken with Eros always in the centre, the motion of the planet will carry it nearer to, or away from, the more outlying members of the group of stars selected for measurement. The motion of Eros in the interval was about 8′–10′, and in a field the available diameter of which is small the distortion of the image might outweigh the evident theoretical advantages.

To test this point Prof. Perrine has made two solutions, according to the stars selected, and can find no evidence of systematic error. Another attempt to explain the observed discrepancy, more of the nature of a suggestion than a criticism, was made to depend upon the generally small magnitude of the comparison stars. With a large aperture and the necessity of restricting the field, there will be a tendency to use fainter stars than in other observatories employing the ordinary photo-refracting telescope. As a rule, the stars selected at Lick have been fainter than the planet. Prof. Perrine does not specifically discuss the effect of magnitude, and there is the less necessity, since the value of the solar parallax he obtains does not show any anomalous deviation from the final value adopted by Mr. Hinks.

The difference of computational results is a point of great interest. The final value of solar parallax derived from the total mass of measures at the command of Mr. Hinks is 8·807″, while the same authority obtained from the Lick measures alone 8·815″. From the same data Prof. Perrine derives from his own measures 8·8067″, or identically Mr. Hinks's result. The problem for solution has therefore moved from finding an explanation of the difference of Lick results from the general average to tracing the cause of the disagreement between the Cambridge and the Californian computations. The computed probable errors also differ. That attached by Prof. Perrine in his final equation for π is ±0·0025″, and by Mr. Hinks ±0·0046″. It is a matter for congratulation that such small differences should attract attention and call for explanation. The minuteness of the discrepancy seems to indicate that in modern processes such a degree of refinement has been reached that the disagreement must be attributed to purely arithmetical operations, and has no physical significance.

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[1] "Determination of the Solar Parallax," from Photographs of Eros, made with the Crossley Reflector of the Lick Observatory, University of California. By Charles D. Perrine, and others. Pp. v+98. (Carnegie Institution of Washington, 1910.)

AMERICAN VERTEBRATE PALÆONTOLOGY.

THE phylogeny of the Felidæ forms the subject of an article, by Dr. W. D. Matthew, published in vol. xxviii. (pp. 289–316) of the Bulletin of the American Museum of Natural History. According to the author, the great majority of the extinct members of the family, including all the oldest species, are characterised by a more or less pronounced development of the upper canines into long, flat-sided tusks. These are the so-called sabre-tooths, or machærodonts, which date from the Lower Oligocene, typical cats with relatively short upper canines being unknown before the Pliocene. The early sabre-tooths are, however, divisible into two series, one characterised by the extreme length and slenderness of the tusks and the large size of the protecting flange on the lower jaw, and the other by the shorter tusks and smaller flange. Hoplophoneus and Dinictis respectively represent the two series in America. While the derivation of the large Pliocene and Pleistocene sabre-tooths from Hoplophoneus has been accepted, the relations of the modern cats to Dinictis have been overlooked. "The evidence appears, however, to indicate that the Dinictis phylum led